Express Mail No. EL844351183US

# PATENT APPLICATION OF

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# ENTITLED

# OIL PICKUP APPARATUS FOR HERMETIC COMPRESSOR

Docket No. S84.12-0004

# OIL PICKUP APPARATUS FOR HERMETIC COMPRESSOR

The present application is based on and claims the benefit of Korean patent application Serial Nos. 2001-42547, filed July 14, 2001, the contents of which are hereby incorporated by reference in their entirety.

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to a hermetic compressor, and more particularly to an oil pickup apparatus for a hermetic compressor to supply the oil filled up in a lower part of the shell to each part of the compressor.

### 2. Description of the Related Art

Generally, a hermetic compressor includes a shell 1, an electric driving unit 10 disposed in the shell 1, and a compressing unit 20 for compressing a refrigerant by linearly reciprocating by being transmitted a power from the electric driving unit 10. The electric driving unit 10 includes a rotor 11 and a stator 12.

A predetermined amount of oil is filled up in a lower part of the shell 1. A crank shaft 14, having an eccentric portion 13, is inserted by pressing in the rotor 11. The crank shaft 14 is rotatably supported to bearings 15. The compressing unit 20 includes a cylinder block 21, a piston 23, disposed in the cylinder block 21 in order to linearly reciprocate, and a connecting rod 25 for connecting the piston 23 and the eccentric portion 13. In the

above construction, if the crank shaft 14 rotates with the rotor 11, the piston 23 linearly reciprocates in a cylinder 21a of the cylinder block 21. Then, the refrigerant is discharged and drawn into repeatedly by a movement of the piston 23.

On the other hand, the compressor having the above construction is a so-called upper cylinder-type compressor that the compressing unit 20 is disposed at an upper part thereof. An oil pickup apparatus 30, which picks up and supplies the oil 3 to each part of the compressor, is disposed at a lower part of the crank shaft 14. As shown in FIG. 2, the oil pickup apparatus 30 comprises an oil pickup tube 31 connected with the lower part of the crank shaft 14, and an impeller 33 installed in the oil pickup tube 31. The impeller 33 takes a twist type, and picks up the oil 3 by a centrifugal force when the crank shaft 14 rotates. After that, the impeller 33 supplies the oil 3 to an oil guide passage 14a of the crank shaft 14 through the oil pickup tube 31. The oil 3 supplied like the above lubricates the piston 23, the crank shaft 14, and the bearing 15.

However, the oil pickup apparatus having the above construction has to be assembled after manufacturing the impeller 33 and the oil pickup tube 31 separately, thus, the cost of production increases. Moreover, there is a difficult in assembling and applying, and the construction is complicated.

## SUMMARY OF THE INVENTION

The present invention has been made to overcome the above-mentioned problems of the related art. Accordingly, it is an object of the present invention to provide an oil pickup apparatus for a hermetic compressor that has an improved construction by integrally forming an impeller and an oil pickup tube.

The oil pickup apparatus for a hermetic compressor according to the present invention to accomplish the above object of the present invention connected with a crank shaft in order to pickup an oil filled up in a lower part of a shell comprises an oil pickup tube having one end immersed in the oil and being connected with the crank shaft to be rotated together, and the oil pickup tube having an impeller portion integrally formed at the oil pickup tube in order to pickup the oil by a centrifugal force when the crank shaft rotates and supply the oil to an upper part of the compressor.

Here, it is preferable that the impeller portion includes a plurality of unit processing portions having a depressed outer circumference of the oil pickup tube and a protruded corresponding inner circumference.

Moreover, it is recommended that a plurality of unit processing portions are disposed in a circumferential direction of the oil pickup tube, and formed for a predetermined length to be sloped for a

predetermined angle in a longitudinal direction of the oil pickup tube.

In addition, it is advisable that the impeller portion includes a plurality of bent-up wings formed by cutting the outer circumference of the oil pickup tube as a predetermined type in a diagonal direction, and bending up the cut parts to be protruded to an inner circumference of the oil pickup tube.

Furthermore, it is preferable that the impeller portion includes a plurality of protruding portions formed by cutting an end portion of the oil pickup tube for a predetermined distance in the circumferential direction, and the protruding portions have sloping sides sloped from the end to the inner circumference.

In addition, it is recommended that an eccentric portion connected with a connecting rod is disposed at an upper end of the crank shaft, and the oil pickup tube is coaxially connected with a lower end of the crank shaft.

Moreover, it is advisable that an eccentric portion connected with a connecting rod is disposed at the lower end of the crank shaft, and the oil pickup tube is connected with the eccentric portion.

Furthermore, it is preferable that the oil pickup tube comprises: an straight-type upper tube portion coaxially connected with the eccentric portion; a sloping portion extended to be sloped for a predetermined length downwardly from the upper tube portion; and a lower tube portion perpendicularly

extended from the sloping portion to have a same axis with the crank shaft, and the lower tube portion has the impeller.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic sectional view partly showing a conventional hermetic compressor;

FIG. 2 is a schematic sectional view showing an important part of FIG. 1;

FIG. 3 is a schematic sectional view showing an oil pickup apparatus for a hermetic compressor according to the preferred embodiment of the present invention;

FIG. 4A is an enlarged view showing an important part of FIG. 3;

FIG. 4B is a sectional view of line I-I of FIG. 4A;

FIG. 5A is a view showing another preferred embodiment of the oil pickup apparatus shown in FIG. 3;

FIG. 5B is a sectional view of line II-II of FIG. 5A;

FIG. 6A is a view showing another preferred embodiment of the oil pickup apparatus shown in FIG. 3;

FIG. 6B is a bottom view showing the oil pickup tube shown in FIG. 6A;

FIG. 7 is a schematic sectional view showing the oil pickup apparatus for a hermetic compressor according to another preferred embodiment of the present invention;

FIG. 8 is a view showing the oil pickup tube extracted from FIG. 7; and

FIGS. 9A and 9B are showing another preferred embodiment of the oil pickup apparatus shown in FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

From now on, the preferred embodiments of the present invention will be described by referring to the accompanying drawings.

Referring to FIG. 3, a hermetic compressor applying an oil pickup apparatus according to the preferred embodiment of the present invention comprises a shell 40, an electric driving unit 50 disposed in the shell 40, a compressing unit 60, and an oil pickup apparatus 70.

The shell 40 is almost a sphere type, and is shielded from the outside. An oil 41 is filled up in a lower part of the shell 40. The oil 41 is picked up by the oil pickup apparatus 70, and is supplied to the electric driving unit 50 and the compressing unit 60 to lubricate each part of the compressor.

The electric driving unit 50 comprises a crank shaft 51, a rotor 53 connected with the crank shaft 51 and rotates with the crank shaft 51, and a stator 55 disposed at an out side of the rotor 53. The crank shaft 51 is rotatably supported to bearings 57. Moreover, an eccentric portion 59 is installed at an upper end of the crank shaft 51.

The compressing unit 60 comprises a cylinder block 61 having a cylinder 62, a piston 63 disposed

for moving reciprocally in the cylinder 62, and a connecting rod 65 for connecting the piston 63 and the eccentric portion 59. A refrigerant is discharged and drawn into by a reciprocal movement of the piston 63.

As described above, when the eccentric portion 59 is disposed at the upper end of the crank shaft 51, and the cylinder block 61 is disposed at the upper part of the compressor, it is called a cylinder upper-type (a scotch york) compressor.

The oil pickup apparatus 70 picks up the oil filled up in the lower part of the shell 40, and comprises an oil pickup tube 71 connected with the lower end of the crank shaft 51. The oil pickup tube 71 is connected by pressing with an oil guide hole 51a formed at the crank shaft 51. The oil pickup tube 71 is a pipe-type, and has an impeller portion integrally formed at the lower end thereof, as shown in FIGS. 4A and 4B. The impeller portion has a depressed outer circumference of the oil pickup tube 71 and an unit processing portion 73 processed to have a protruded inner circumference corresponding to the depressed outer circumference. A plurality of unit processing portions 73 are disposed for a predetermined distance in a circumferential direction. Each unit processing portion 73 is formed for a predetermined length to be sloped for a predetermined angle in an axial direction X of the oil pickup tube 71. The unit processing portion 73 can be easily formed by properly designing a mold of

an oil pickup tube 71. The impeller formed as the diagonal unit processing portion 73 picks up the oil 41 by a centrifugal force when the oil pickup tube 71 rotates with the crank shaft 51, and effectively supplies the oil 41 to an upper part of the compressor. In addition, since the impeller is integrally formed at the oil pickup tube 71, the cost of manufacturing, installation, and assembling becomes lower.

On the other hand, FIGS. 5A and 5B show an oil pickup apparatus 171 according to another preferred embodiment of the present invention. The impeller portion integrally formed at the oil pickup tube 171 comprises a plurality of bent-up wings 173 formed by cutting the lower part of the oil pickup tube 171 for a predetermined type and bending the cut parts to be protruded to the inner circumferential side. Therefore, the bent-up wings 173 have a predetermined sloping angle and a predetermined length in a diagonal direction of the oil pickup tube 171. When the oil pickup tube 171 of the above construction rotates, the oil 41 is picked up through an inner hole 171a of the oil pickup tube 171, and a hole 171b formed at the outer circumference by forming the bent-up wings 173. The oil 41 is picked up to the upper part by being guided by the centrifugal force of the bent-up wings 173 and supplied.

Moreover, FIGS. 6A and 6B show an oil pickup tube 271 according to another preferred embodiment of the present invention. The impeller integrally formed

at the oil pickup tube 271 comprises a plurality of protruding portions 273 disposed for a predetermined distance in a circumferential direction at the lower end of the oil pickup tube 271. Cutting portions 272 cut for a predetermined depth from the lower end of the oil pickup tube 271 are disposed between the protruding portions 273. In other words, the protruding portions 273 are disposed by processing the cutting portions 272. Moreover, the protruding portions 273 have sloping sides 273a sloped from an end to the inner circumference, and thus the oil 41 can be effectively picked up.

In the meantime, FIG. 7 shows a hermetic compressor applying an oil pickup apparatus according to another preferred embodiment of the present invention. The illustrated hermetic compressor is a cylinder lower-type (non-scotch york) compressor having an eccentric portion 359 disposed at the lower end of the crank shaft 351, and a cylinder block 361 disposed at the lower part thereof. The cylinder lower-type compressor comprises a shell 340 that has an oil 341 at a lower part therein, an electric driving unit 350 having a rotor 353 and a stator 355 rotated with the crank shaft 351, a compressing unit 360 disposed at a lower part of the crank shaft 351, and a oil pickup apparatus 370. Here, the electric driving unit 350 and the compressing unit 360 have the same construction as the electric driving unit 50 and the compressing unit 60 shown in FIG. 3, thus, the description about them will be omitted. Yet, the

compressing unit 360 according to the preferred embodiment is disposed at the lower end of the crank shaft 351.

Meanwhile, an eccentric portion 359 connected with a connecting rod 365 is disposed at the lower end of the crank shaft 351.

The oil pickup apparatus 370 comprises an oil pickup tube 371 connected with the eccentric portion 359 so that a lower end of the oil pickup apparatus 370 can be immersed in the oil 341. As shown in FIG. 8, the oil pickup tube 371 comprises a straight upper tube portion 371a coaxially connected with the eccentric portion 359, a sloping portion 371b extended downwardly to be sloped for a predetermined angle from the upper tube portion 371a, and a straight lower tube portion 371c extended downwardly from the sloping portion 371b to form the same axis with the crank shaft 351. In addition, an impeller portion is integrally formed at an end of the lower tube portion 371c. As described in FIGS. 4A and 4B, the impeller portion has a unit processing portion 373 processed as a predetermined type at the lower tube portion 371c.

In the above construction, the lower tube portion 371c is immersed in the oil 341, and the sloping portion 371b is out of the oil 341. Therefore, when the crank shaft 351 rotates, the upper tube portion 371a eccentrically rotates with the eccentric portion 359, but the lower tube portion 371c coaxially rotates with the crank shaft 351 at

its position. At this time, the unit processing portion 373 disposed at the lower end of the lower tube portion 371c takes a role of the impeller. In other words, the oil 341 is fed through the inner hole of the oil pickup tube 371 by the unit processing portion 373, and passes through the lower tube portion 371c. After that, the oil 341, reached to the sloping portion 371b, is fed faster due to the centrifugal force. As described so far, the impeller of the unit processing portion 373 picks up the oil 341 from the lower tube portion 371c to the sloping portion 371b when the compressor is initially driven. Then, after driving, the centrifugal force of the sloping portion 371b plays an important role in feeding the oil 341, thus, the oil 341 can be effectively picked up.

On the other hand, as shown in FIGS. 9A and 9B, an oil pickup tube 371′ and 371′′ having a bent-up wing 373′ and a protruding portion 373′′ can replace the oil pickup tube 371.

According to the oil pickup apparatus for a hermetic compressor according to the present invention described so far, since the impeller is integrally disposed at the oil pickup tube, the construction of the compressor becomes simpler. Therefore, the prime cost is reduced, and the manufacturing and the applying of the compressor is convenient.

Moreover, the oil pickup apparatus according to the present invention can be easily applied to both

of the cylinder lower-type compressor and the cylinder upper-type compressor.

Although the preferred embodiment of the present invention has been described, it will be understood by those skilled in the art that the present invention should not be limited to the described preferred embodiment. Various changes and modifications can be made within the spirit and scope of the present invention as defined by the appended claims.